

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-11, 22, 23, 29, and 30 are rejected under 35 U.S.C. 102(e) as being anticipated by Clem et al (U.S. 6,518,168).

Regarding claims 1, 5, 7, 8, 22, 29, and 30, Clem et al discloses a method of forming self-assembled monolayer or SAM formed of linear or branched alkyl or other hydrocarbon spacer, i.e. organic molecular species (Col 12, lines 23-37) and thin film on surfaces. The method includes forming a pattern onto a substrate with an applicator, i.e. a stamp, by coating the SAM onto the protrusions of the stamp, applying the stamp to the substrate and removing the stamp from the surface of the substrate, applying a sol-gel precursor to the SAM coated substrate by dip coating or spin casting, which the precursor is in liquid form and after heat treatment, forming an amorphous oxide film at the unpatterned region, i.e. thin film, but the patterned region with the SAM, the thin film adhered poorly and easily removed by thermal and/or mechanical agitation, i.e. without forming covalent bonding (Col 6, lines 14-36), wherein the thin film is in the order of

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micron or submicron range (Col 5, lines 46-55), which is not a monolayer. Furthermore, Clem et al recites the SAM includes a first end with functional group that binds to the desired surface (Col 10, lines 27-30) and a second end with functional group that selected to bind to particular material in any of a variety of functionalities (Col 11, lines 36-39), for example a prepolymer may be applied to the surface wherein the prepolymer is compatible with the exposed functionality of the SAM and incompatible with the surface of the substrate, the prepolymer assembles on the SAM and then can be polymerized but if the prepolymer is incompatible with the functionality of the SAM and compatible with the surface of the substrate, the prepolymer will assemble in a pattern complementary to the pattern of the SAM (Col 18, line 56 to Col 19, line 21), which does not coat the SAM and therefore, does not coat the surface covered by the SAM and the SAM will prevent the prepolymer from coming in contact with SAM coated surface or coat it. Furthermore, since the blocking agent or SAM has a functionality incompatible with the prepolymer and assemble in a pattern complementary to the pattern of SAM, none of the prepolymer would be on the SAM and therefore, does not required addition post-deposition processing to remove the prepolymer from the SAM (Col 18, 56 to Col 19, line 2) and another embodiment also recites at various throughput rates of CVD, which result in selective CVD only at regions not protected by the blocking agent (e.g. SAM) (Col 8, lines 16-19).

Regarding claim 2, Clem et al discloses the substrate includes conductive, nonconductive, semiconducting material, glass, silica, alumina, plastic, and organic polymers. (Col 13, lines 3-15)

Regarding claims 3 and 4, Clem et al discloses the substrate includes curved or non-planar substrate. (Col 8, lines 60-67)

Regarding claim 6, Clem et al discloses the stamp is elastic. (Col 15, lines 36-45)

Regarding claim 9, Clem et al discloses the SAM includes at least one sulfur-containing functional group such as thiols, sulfide, or disulfide. (Col 11, lines 24-27)

Regarding claims 10 and 11, Clem et al discloses the second end of the SAM or tail of SAM includes functional groups such as polar, nonpolar, halogenated, hydrocarbon, and amine. (Col 11, line 36 to Col 12, line 23)

Regarding claim 23, Clem et al discloses the material deposited includes metal oxide. (Col 5, lines 46-51 and Col 6, lines 49-59)

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Clem et al (U.S. 6,518,168) as applied to claim 5 above, and further in view of Chrisey et al (U.S. 5,688,642).

Clem et al discloses the molecular species for the SAM includes “fluorinated hydrocarbon” (See Clem, Col 11, lines 56-63). But, is silent as to the ‘fluorinated

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hydrocarbon" includes (tridecafluoro-1,1,2,2-tetrahydrooctyl) trichlorosilane. However, using (tridecafluoro-1,1,2,2-tetrahydrooctyl) trichlorosilane for SAM is well known and conventional as shown for example by Chrisey et al. Chrisey et al discloses a method of selective attachment of nucleic acid molecules to patterned self-assembled surfaces. The method includes forming a thin film of organosilane (SAM) using (tridecafluoro-1,1,2,2-tetrahydrooctyl)trichlorosilane to form the SAM on a silica slide. (Col 10, lines 29-35)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide (tridecafluoro-1,1,2,2-tetrahydrooctyl) trichlorosilane as a molecular species for forming SAM on a substrate as disclosed by Chrisey et al in the method of Clem et al to provide a method of preparing surfaces, which nucleic acid molecules (NAMs) may be immobilized to form arrays or patterns of NAMs. (See Chrisey et al, Col 3, lines 26-31)

5. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Clem et al (U.S. 6,518,168) as applied to claim 5 above, and further in view of Wefers et al (U.S. 5,059,258).

Clem et al discloses molecular species for the SAM includes hydrocarbon, fluorinated hydrocarbon, halogenated, and phosphate species, (See Clem et al, Col 11, lines 46-66) but, is silent as to the species is octadecylphosphonic acid. However, providing octadecylphosphonic acid as a species for forming SAM is well known and conventional as shown for example by Wefers et al. Wefers et al discloses a method of bonding phosphonic acid to aluminum hydroxide layer. The method includes providing

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a molecular species such as long and short chain hydrocarbon, carboxylic acids, amine, alcohols, organosilicones, polymeric phosphonic acids such as octadecylphosphonic acid, which will form a SAM. (Figure 1 and Col 4, lines 24-66)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide octadecylphosphonic acid as the molecular species for forming SAM on the substrate as disclosed by Wefers et al in the method of Clem et al to provide any molecular species, which are all equivalents to form the SAM on the substrate.

6. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Clem et al (U.S. 6,518,168) as applied to claim 23 above, and further in view of Liang et al (U.S. 5,871,579).

Clem et al as disclosed above of using amines as a functional group on SAM but is silent as to the amines are organic-inorganic hybrid such as  $(C_6H_5C_2H_4NH_3)_2SnI_4$ ,  $(C_4H_9NH_3)_2CH_3NH_3Sn_2I_7$ ,  $(C_6H_5C_2H_4NH_3)_2CH_3NH_3SnI_4$ ,  $(H_3NC_4H_8NH_3)_2SnI_4$ , and a mixture thereof. However, using organic-inorganic hybrid to form thin film is well known and conventional as shown for example by Liang et al. Liang et al discloses a method of forming organic-inorganic perovskite thin film. The method includes depositing a thin film of  $MI_2$  onto a glass or quartz substrate (Col 3, lines 21-29), immersing the thin film into a solution of desired organic ammonium iodide to obtain the perovskite thin film or organic-inorganic hybrid of  $(C_6H_5C_2H_4NH_3)_2SnI_4$ ,  $(C_4H_9NH_3)_2CH_3NH_3Sn_2I_7$ ,  $(C_6H_5C_2H_4NH_3)_2CH_3NH_3SnI_4$ , and  $(H_3NC_4H_8NH_3)_2SnI_4$ . (Col 4, line 13 to Col 6, line 53)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide thin film of  $(C_6H_5C_2H_4NH_3)_2SnI_4$ ,  $(C_4H_9NH_3)_2CH_3NH_3Sn_2I_7$ ,  $(C_6H_5C_2H_4NH_3)_2CH_3NH_3SnI_4$ , and  $(H_3NC_4H_8NH_3)_2SnI_4$  as disclosed by Liang et al in the method of Clem et al to provide a semiconductor layer with strong luminescence for building electrical device. (See Liang et al, Col 1, lines 31-44)

7. Claims 25, 26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clem et al (U.S. 6,518,168) as applied to claim 23 above, and further in view of Hawker et al (U.S. 6,423,465).

Clem et al as disclosed above is silent as to thin film is a photoresist. However, providing a photoresist on a monolayer is well known and conventional as shown for example by Hawker et al. Hawker et al discloses a method of forming patterned polymeric brush on a substrate surface. The method include forming the polymeric brush on the substrate the same way as self assembled monolayer, which is a monolayer of polymeric material (Col 1, lines 50-62), applying a polymer composition such as methyl methacrylate-co-methacrylic acid by spin coating or dip coating, applying a deep UV radiation to the decompose the photoacid generator and removing the remaining photoresist by washing with appropriate solvent. (Col 11, lines 18-67) Furthermore, photoresist coating is imagewise expose to the UV radiation (Col 11, lines 44-50) and inherently includes either a positive or a negative image of the desired pattern.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a photoresist on a monolayer of polymer brush and applying deep UV radiation to form either a positive or negative image pattern on the photoresist as disclosed by Hawker et al in the method of Clem et al to provide a processing technologies for semiconductor with extremely stable, high resolution, and versatile product. (See Hawker et al, Col 2, lines 37-40)

8. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Clem et al (U.S. 6,518,168) as applied to claim 23 above, and further in view of Schildkraut et al (U.S. 5,115,336).

Clem et al as disclosed above is silent as to thin film is metallo-organic complex of tin 2-ethylhexanoate. However, providing a coating on a SAM with metallo-organic complex is well known and conventional as shown for example by Schildkraut et al. Schildkraut et al discloses a method of forming a photorefractive system. The system includes an optically active layer formed by SAM (Col 12, lines 51-62) and forming a protective coating using metal fluoride coating by thermal decomposition of the metal carboxylate, i.e. metal acetate<sup>3</sup> or 2-ethylhexanoate (Col 16, lines 5-9 and Col 16, lines 34-44), wherein the metal includes alkaline earth, rare earth, and alkali oxide and fluoride (Col 16, lines 9-26), which inherently includes tin as a rare earth metal.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a protective coating on the SAM using a metal 2-ethylhexanoate such as tin 2-ethylhexanoate as disclosed by Schildkraut et al in the

method of Clem et al to provide a inert stable compounds as an protective layer for the SAM. (See Schildkraut et al, Col 16, lines 9-12)

### ***Response to Arguments***

9. Applicant's arguments filed March 28, 2008 have been fully considered but they are not persuasive.

10. In response to applicant's argument of Clem's method of requiring thermal and/or mechanical agitation as a post-deposition processing to remove material such as precursor sources, which adheres loosely and poorly to the blocking agent or SAM, Clem recites the need for post-deposition processing to remove these materials from the blocking agent but depending on the embodiments which blocking agent is used, Clem may not require a post-processing step. Clem recites the embodiment of using SAM with a functionality exposed by SAM that is incompatible with the prepolymer and compatible with the substrate, the prepolymer will assemble in a pattern complementary to the pattern of the SAM and not on the SAM, which does not require a post-deposition process to remove the prepolymer from the SAM surfaces (See Col 18, line 56 to Col 19, line 2) and furthermore, another embodiment also recites at various throughput rates of CVD, which result in selective CVD only at regions not protected by the blocking agent (e.g. SAM) (Col 8, lines 16-19), which would not requiring further post-deposition processing to remove material from the SAM.

### ***Conclusion***

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP



§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SING P. CHAN whose telephone number is (571)272-1225. The examiner can normally be reached on Monday-Thursday 7:30AM-11:00AM and 12:00PM-4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Philip C. Tucker can be reached on 571-272-1095. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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